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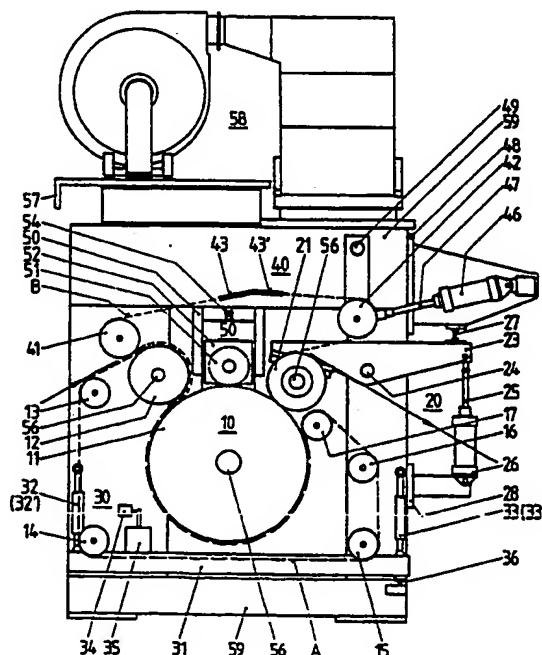
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(54) Title: APPLIANCE FOR THE THERMAL BONDING OF ABSORBENT PADS TO ARTICLES OF HYGIENE FOR THE ABSORPTION OF BODY FLUID

(57) Abstract

A thermal bonding appliance (10) combined with a calendering, smoothing and/or embossing roller pressing appliance (20) and intended for the treatment of absorbent pads on articles of hygiene consists of a pressure band (A) which rotates endlessly via a heating cylinder (11) and rollers (17, 16, 15, 14, 13, 12) back to the heating cylinder (11) and which partially loops adjustably around the circumference of the heating cylinder (11) and the pressure band (A). For the perfect introduction and fault-free run-through of the absorbent pads to be bonded, even at very high working speeds, there is a laying-down device (40) for an endlessly rotating filamentary material (44), preferably a wire rope, laid at a mutual distance over the sheet width, the absorbent pads (F, F') predominantly being guided between the wire-rope laying-down device (40) and the pressure band (A). A press roller (21) of the calendering, smoothing and embossing roller pressing appliance (20) so interacts with the heating cylinder (11) outside the looped-round region of the pressure band that the heating cylinder (11) is additionally a calendering roller.



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Appliance for the thermal bonding of absorbent pads
to articles of hygiene for the absorption of body fluid

5 The invention relates to an appliance for the
thermal bonding of absorbent pads according to the
precharacterising clause of Patent Claim 1.

10 A thermal bonding appliance of this type, a
so-called thermobonding apparatus, which can be
inserted into an already existing production system
working continuously and which is intended for
absorbent pads treated with an absorbent agent and
employs a hot-air throughflow principle is known. The
alternating air throughflow heats, on two perforated
drums, both sides of the absorbent pads joined in sheet
form and, if appropriate, covered on both sides with
15 covering sheets. The cellulose/synthetic pulp mixture
is thermally bonded, a superabsorber being fixed at
predetermined points of the absorbent pads.

20 An appliance of this type is not suitable for
the thermal bonding of individual freely lying
absorbent pads conveyed at a distance behind and/or
next to one another or of those which are covered with
a covering sheet on one side only.

25 Another disadvantage, particularly with regard
to multilayer absorbent pads, is the reduced
run-through speed, the result of this being that the
production capacity of the entire continuously working
production system is impaired.

30 DE-B-1,296,363, for example, relates to a
process for the adhesive bonding of a paper sheet to a
flexible, tough, transparent plastic film. In this, one
or more paper sheets are coated with a film of this
type either on one side or on both sides, specifically
with the use of a special adhesive layer under the
effect of heat. The sheets to be coated run through
35 between a guide roller with a relatively larger
diameter, so that the thermoplastic adhesive covering
of the plastic film covered with radiation-absorbing
separating sheets is subjected to less bending stress,

and a conveyor band. An intensive radiation energy, for example from infrared radiation, is brought to bear from the side of the radiation-absorbing sheet for the purpose of activating the adhesive. No heating and/or
5 calendering rollers are used, and there is also no filamentary laying-down device for achieving an improved absorbency and further transport of the absorbent pads.

With regard to absorbent pads on articles of hygiene which subsequently also have to be calendered, smoothed or embossed, there follows as a separate
10 device an additional pressing appliance, for example a pair of double rollers.

The object on which the present invention is based is, therefore, to provide a thermal bonding
15 appliance, in which not only shaped absorbent pads joined in sheet form and covered on both sides, but also especially individual freely lying absorbent pads equipped with a covering sheet on one side can be
20 thermally bonded, even at very high run-through speeds, and a fault-free introduction and smooth run-through are guaranteed, even where multilayer absorbent pads are concerned, whilst at the same time a possibly
25 necessary calendering, smoothing and/or embossing roller pressing appliance will be substantially simplified.

According to the invention, this object is achieved by means of the features indicated in the characterising clause of Claim 1, whilst the remaining
30 claims relate to advantageous further embodiments of the appliance.

The individual absorbent pads laid down freely between the pressure band and heating cylinder or additionally equipped on one side or both sides with
35 covering sheets, preferably nonwoven sheets, can be bonded in a similar way to the bonding appliances according to WO/13278, in that the laying-down device is put out of operation, the press roller is lifted off from the heating cylinder and the absorbent pads are

transported to the next production station via the defecting roller preceding the press roller.

According to a further development in relation to the thermal bonding appliance described in WO 90/13278, a laying-down device formed from endlessly rotating filamentary material, preferably a wire rope, guarantees a perfect introduction and fault-free run-through of the absorbent pads to be bonded, even at very high working speeds.

The absorbent pads to be bonded are taken up between the endless wire-rope laying-down device guided on the heating cylinder and the pressure band, the groove-shaped impression of the laying-down device on the side of the absorbent pads facing the heating cylinder affording an improved absorbency and also making the further transport of the absorbent pads easier, especially where absorbent pads of multilayer construction are concerned.

Because the groove-shaped impression of the laying-down device extends in the longitudinal direction of the absorbent pads, for example as regards a napkin it becomes appreciably more difficult for body fluid to escape laterally.

It is also advantageous that the superabsorber already introduced into the absorbent pads is retained between two respective depressions (grooves) of the laying-down device which are impressed at a distance from one another, so that an accumulation of the superabsorber which blocks gel formation, so-called "block gelling", is largely prevented.

A further essential advantage arises with regard to articles of hygiene which, after the thermal bonding, also subsequently have to be calendered, smoothed or embossed, in that the corresponding pressing appliance is integrated into the bonding appliance. The heatable press roller is adjustable under pressure relative to the heating cylinder in the region free of the pressure band and together with the heating cylinder forms a pair of calendering, smoothing

or embossing rollers. Because there is no need for an additional pressing appliance, in addition to a saving of space the heat losses are reduced substantially.

5 If smooth surfaces of the thermally bonded and calendered absorbent pads are to be achieved, the press roller is equipped over the sheet width with spacer grooves for the filamentary material, so that, for example, the wire-rope laying-down device is aligned with the surface of the press roller.

10 An exemplary embodiment of the arrangement according to the invention of the thermal bonding appliance combined with a pressing appliance is illustrated in the drawing.

In a diagrammatic drawing:

15 Figure 1 shows a side view from the right of a bonding and pressing appliance,

Figure 2 shows a side view from the left of the appliance according to Figure 1 with the corresponding drives, and

20 Figure 3 shows a diagrammatic perspective representation according to Figure 1 with the laying-down device.

According to Figures 1 and 2, the thermal bonding appliance 10 according to the invention
25 consists of a double-walled heating cylinder 11, in which, for example, hot oil circulates as a heating medium. Looped partially round the lower half of the heating cylinder 11 is a pressure band A which is guided via deflecting rollers 17,16, a tensionable
30 deflecting roller 15, further deflecting rollers 14,13 and a deflecting heating roller 12 back to the heating cylinder 11.

The deflecting roller 14 and the tensionable deflecting roller 15 are mounted on a tensioning frame
35 31 of a pressure-band control 30. The tensioning frame 31 is supported movably on a bearing point 36 arranged in the longitudinal direction. By means of a band control 34, the tension and parallel run of the pressure band A are monitored and deviations are

compensated via a pulse transmitter 35 and parallel regulating devices 32(32') and band-tension regulating devices 33(33') of the tensioning frame 31. The thermal bonding appliance 10 is combined with a calendering, smoothing and/or embossing roller pressing appliance 20, the contact pressure of a heatable press roller 21 being adjustable relative to the heating cylinder 11 by means of a nip setting 27. The press roller 21 is fastened to one end of a two-armed lever 23 by means of a mounting 22, and a piston/cylinder unit 25,26 arranged on the frame 59 by means of a bracket 28 acts on the end of the two-armed lever 23 opposite the press roller 21. If articles of hygiene which do not have to be calendered, smoothed or embossed are being produced, the press roller 21 is lifted off from the heating cylinder 11 as a result of the actuation of the piston/cylinder unit 25,26, so that the press roller 21 merely performs the function of a deflecting roller for a filamentary laying-down material, preferably a wire-rope laying-down device, as described further below.

To make it easier to introduce the individual freely lying absorbent pads and to guarantee a perfect run through the thermal bonding appliance 10 combined with the pressing appliance 20, even at very high working speeds, according to Figures 1 and 3 there is a laying-down device 40 which pays out an endless filamentary material and which lays the endlessly connected material, such as filament yarn, endless rope, continuous ribbon and the like, preferably wire rope 44, into spacer grooves 45. The laying-down device 40 consists of a guide roller 41 and of a guide/tension roller 42 which are both grooved and the latter of which is connected to a piston rod 47 of a pneumatic piston/cylinder unit (46,47) in order to tension said laying-down device 40. By means of two guide rolls 43,43' limiting the laying-down width, the endless wire rope 44 is guided via the spacer grooves 45 of the guide/tension roller 42, the likewise grooved guide

roller 41 and the deflecting/heating roller 12 directly via the heating cylinder 11 and the press roller 21 back to the guide/tension roller 42, so that the non-bonded absorbent pads F are taken up between the pressure band A and the wire-rope laying-down device 44 guided via the heating cylinder 11, whilst the absorbent pads F' thermally bonded or additionally also calendered, smoothed or embossed by the press roller 21 are transported to the following production station via the press roller 21.

The pattern 44 of the wire laying-down device (longitudinally groove-shaped depressions) impressed in the surface of the bonded absorbent pad F' achieves an improved absorbency and, especially where multilayer absorbent pads are concerned, a cohesion, advantageous for further processing, of the thermally bonded absorbent pads F', if appropriate also pressed by the press roller 21. To guarantee a perfect separation of the absorbent pads from the wire laying-down device 40, a comb-shaped separating strip (not shown) is arranged immediately after the press roller 21 in the direction of run.

The heating cylinder 11 is cleaned continuously by means of a cleaning brush 51 arranged in a box 52 and belonging to a brush device 50, and the brush 51 can be raised and lowered vertically relative to the heating cylinder 11 in guides 53 via a lifting device 54. A suction fan 58 with a filter (not shown) known per se is arranged above the thermal bonding appliance 10 combined with the pressing appliance 20. The filter consists of unrolling and rolling-up devices arranged on both sides of the appliance 10 for a textile filter web, the filter web being unrolled from one side and rolled up on the other side and air cleaned in this way being fed back into the air circuit of the appliance. The entire thermal bonding appliance 10 combined with the pressing appliance 20 is encased in a thermal insulation 57 partially indicated, in order to keep heat losses low.

According to Figure 2, the drive 60 of the thermal bonding appliance 10 and of the pressing appliance 20 takes place by means of a flat belt, preferably made of plastic, via a driving roller 61 coupled to a drive unit, preferably an electrical drive unit, a tensioning/deflecting roller 62, a deflecting roller 63, a belt pulley 64 and a belt pulley 66 of the heating cylinder 11, a belt pulley 65 driving the press roller 21 synchronously from the belt pulley 64 by means of a toothed belt D. The brush 51 of the cleaning device 50 is likewise driven by an electric motor 55 via a multiple round belt E. V-belts and/or toothed belts could also be used instead of the round belts E and the flat belt C.

The combined thermal bonding and pressing appliance 10,20 is not restricted to absorbent pads for articles of hygiene; thus, absorbent pads containing superabsorber material covered on both sides could also be produced as a protective device against the effects of water.

Patent Claims

1. Appliance for the mutual thermal bonding of one or more sides of a plurality of layers of material layers different from one another, preferably for bonding absorbent pads to articles of hygiene for the absorption of body fluids, especially for napkins, sanitary towels, pants inserts and the like, which are shaped to the body and which are pretreated with an absorbent agent, especially a superabsorber polymer powder, the various material layers being guided via heating cylinders and tensioning and deflecting rollers and via an advance device formed from bands or from porous fabric strips, characterised in that a rotating endless pressure band (A) is arranged via the heating cylinder (11) and the deflecting rollers (16, 17) and via a deflecting heating roller (15) and further deflecting rollers (13, 14) and via the deflecting roller (12) back via the heating cylinder (11), and the pressure band (A) partially loops round the circumference of the heating cylinder (11) with an adjustable tension, the absorbent pads individually lying freely and/or being joined in sheet form between the looped-round surface of the heating cylinder (11) and the pressure band, and a laying-down device (40) with endlessly rotating filamentary material (44) forming at a mutual distance over the sheet width the advance device and, if appropriate, for the bonded absorbent pads a press roller (21) interacting with the heating cylinder (11) and belonging to a calendering, smoothing and/or embossing roller pressing appliance (20) being provided, and in that the calendering, smoothing and/or embossing roller pressing appliance (20) is integrated into the thermal bonding appliance (10), in that the press roller (21) so interacts with the heating cylinder (11) outside the looped-round pressure band (A) that the heating cylinder (11) is additionally a calendering roller.

2. Appliance according to Claim 1, characterised

in that the deflecting roller (14) and the tensioning/deflecting roller (15) are fastened to a tensioning frame (31) supported on a bearing point (36), and by means of a band control (34) and a pulse transmitter (35) the pressure band (A) is made adjustable by parallel regulating devices (32, 32') and tension-regulating devices (33, 33').

3. Appliance according to Claim 1 or 2, characterised in that the press roller (21) arranged at one end of a two-armed lever (23) is designed so that, by means of a piston/cylinder unit (25, 26), it can be pressed against the heating cylinder (11) by means of a piston rod (25) via a [lacuna] onto the second end of the two-armed lever (23) rotatable in the bearing (24) and can be relieved of pressure, and in that a setting device (27) is provided for setting the nip between the heating cylinder (11) and the press roller (21).

4. Appliance according to one of Claims 1 to 3, characterised in that a hot-oil circulation line (56) is provided for heating the double-walled heating cylinder (11), the deflecting/heating roller (12) and the press roller (21).

5. Appliance according to one of Claims 1 to 4, characterised in that the laying-down device (40) for an endlessly rotating filamentary material (44) is provided as a run-through for the thermal bonding of the absorbent pads (F, F'), and in that this [lacuna] of a guide roller (41), of a guide/tension roller (42) with spacer grooves (45) and of [lacuna] guide rolls (43, 43') are provided at the outer edges of the laying-down device, and [lacuna] is arranged on the guide/tension roller (42) via a pneumatic piston cylinder (46, 47).

6. Appliance according to Claim 5, characterised in that the paid-out endlessly rotating filamentary material (44) is guided via the first guide roll (43), the guide roller (41), the deflecting/tensioning roller (12), the heating cylinder (11), the press roller (21) and the guide/tension roller (42) to the second guide

roll (43').

7. Appliance according to one of Claims 1 to 6, characterised in that the press roller (21) has spacer grooves (45) over the sheet width.

5 8. Appliance according to one of Claims 1 to 7, characterised in that the paid-out filamentary material (44) is formed from a filament yarn, endless rope or continuous ribbon, preferably from an endlessly connected wire rope.

10 9. Appliance according to one of Claims 1 to 8, characterised in that, for cleaning the heating cylinder (11), a raisable brush (51) driven by motor (55) via a multiple round belt (E) and belonging to a brush cleaning device (50) with a suction extractor
15 (58) is arranged above the heating cylinder (11).

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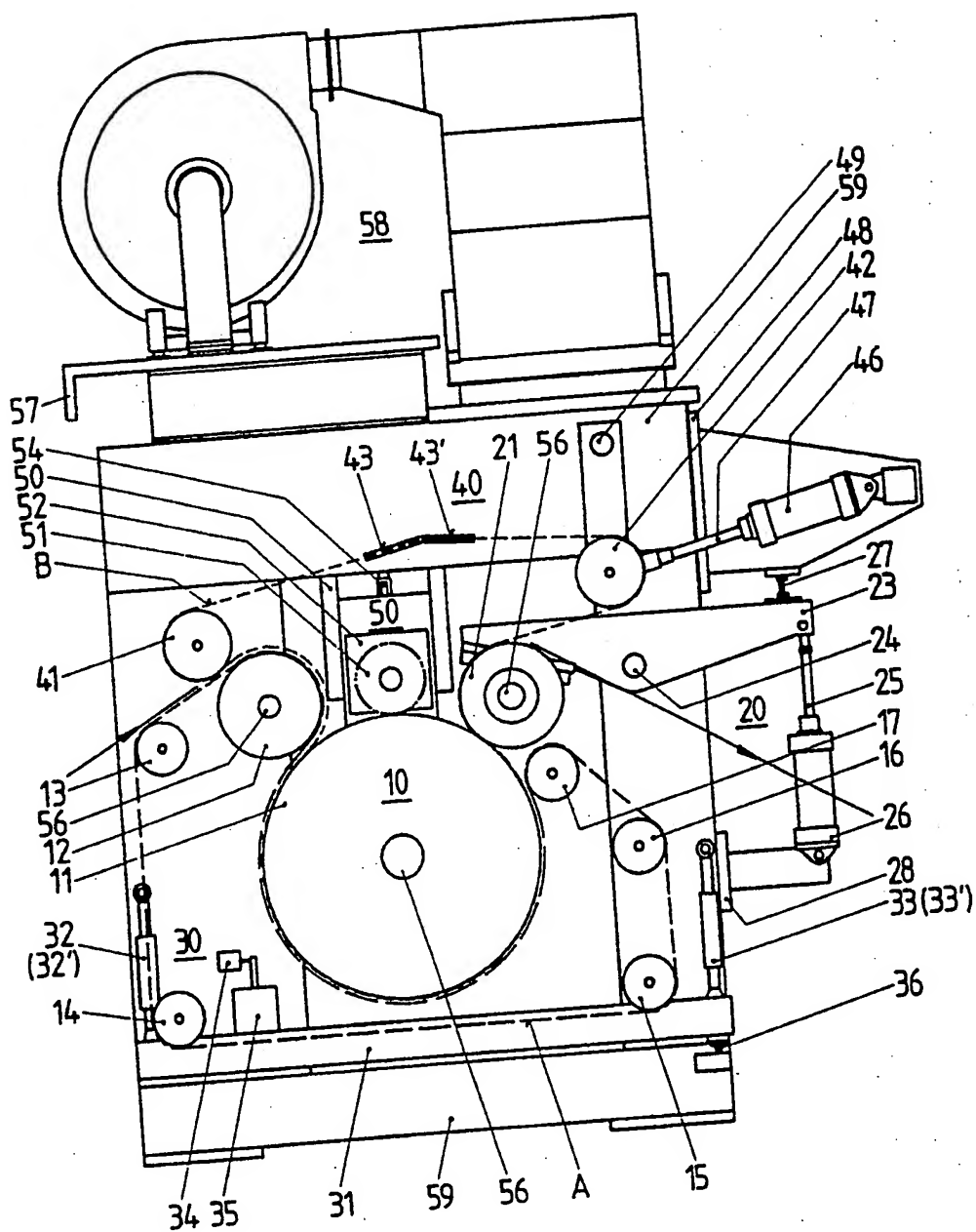


FIG. 1

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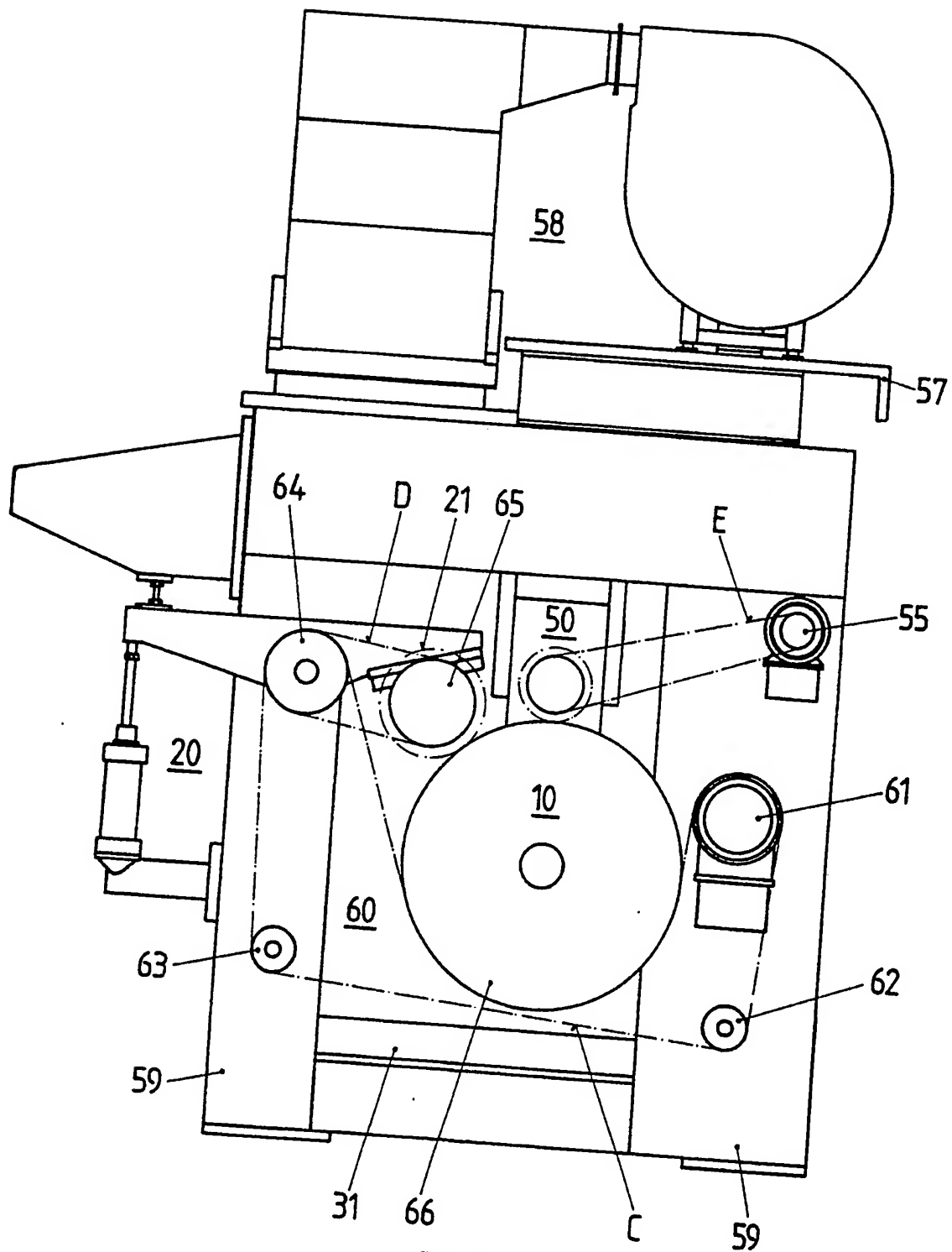


FIG. 2

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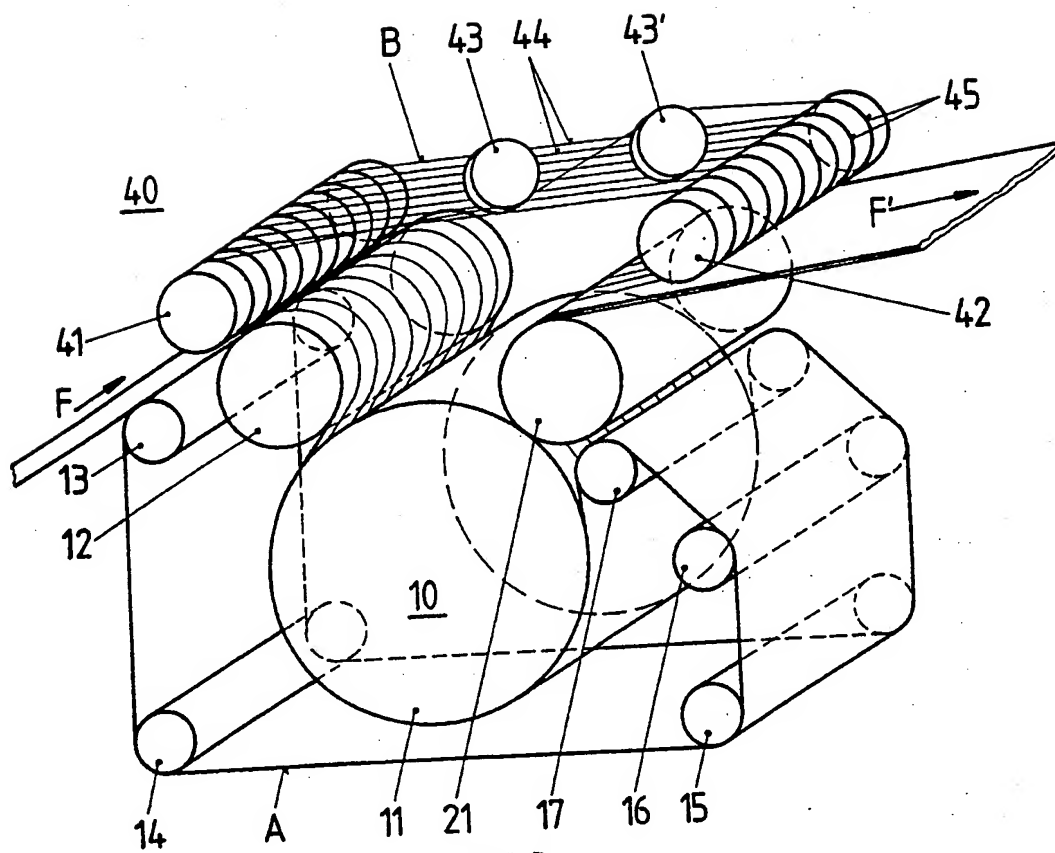


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 91/00549

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC⁵: B 32 B 31/08, A 61 F 13/15

II. FIELDS SEARCHED

Classification System

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A 61 F, B 31 D, B 32 B

Documentation Searched other than Minimum Documentation
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III. DOCUMENTS CONSIDERED TO BE RELEVANT *

Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	DE, B, 1296363 (MINNESOTA) 29 May 1969 see figure 4 cited in the application ---	1
A	GB, A, 643078 (BURGESS) 15 September 1950 ---	
A	FR, A, 1390495 (ANNE CO. LTD) 1965 ---	
A	DE, A, 2046184 (LEMAIRE) 23 March 1972 -----	

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IV. CERTIFICATION

Date of the Actual Completion of the International Search

31st May 1991

Date of Mailing of this International Search Report

22 JUL 1991

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

MISS T. FAZELAAR

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

EP 9100549
SA 45803

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 16/07/91
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-B- 1296363		None	
GB-A- 643078		None	
FR-A- 1390495		None	
DE-A- 2046184	23-03-72	FR-A- 2086941	31-12-71

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